INTERNATIONAL CONFERENCE ON
MARINE POLLUTION, 1973

INFORMATION MATERIAL RELATED TO THE CONSIDERATION OF THE DRAFT
INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973
AND ITS ANNEXES

"Monitoring of Lead-on-Top"

Submitted jointly by the International Chamber of Shipping
and the Oil Companies International Marine Forum

The Oil Companies International Marine Forum and the International Chamber of Shipping recently co-operated in the preparation of a guide for the monitoring of the lead-on-top system at tanker terminals. The guide is a complement to the "Clean Seas Guide for Oil Tankers" produced jointly by ICS and OCIMF in 1972 and describes a method of monitoring oil retained on board. It has been prepared to assist the tanker industry in complying with effective lead-on-top operations, and will help loading terminals to understand the requirements for gauging the contents of the slop tanks of visiting tankers.

A copy of the new guide is attached* for the information of delegates to the Conference.

* Due to the limited number of copies available, only two copies per delegation will be distributed (in English) during the Conference.
Monitoring of Load on Top

A Guide for Procedures at Tanker Terminals:
A Complement to “Clean Seas Guide for Oil Tankers”

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and
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IMPORTANT NOTE

This guide includes in its various sections up-to-date information on methods for monitoring at tanker terminals of slop oil retained aboard tankers that have performed the Load-On-Top operation. This recommended monitoring procedure will undoubtedly have to be revised as additional knowledge and experience become available.

The recommendations are only guidelines. Each oil company must decide whether and to what extent it is practicable and advisable to follow these guidelines. Decisions of this kind may, of course, involve considerations the guide does not attempt to discuss.

Although the monitoring arrangements discussed in this guide indicate that certain functions are to be performed by tanker terminals, it is not intended to preclude alternative arrangements for carrying out these practices.

For the purpose of this Guide the following interpretation and explanation applies:

LOADING TERMINALS

"Loading terminal" as used in this Guide assumes that most monitoring will take place prior to the loading of persistent oils. However on occasion this exercise may take place at intermediate bunkering ports and other ports of call.

MEASUREMENTS

It is recommended that all measurements of quantities in these inspections are expressed in terms of volume. The units used may be barrels, cubic metres etc. as appropriate to the calibration tables of the vessel under inspection.
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MONITORING OF LOAD-ON-TOP
A GUIDE FOR PROCEDURES AT TANKER TERMINALS:
A COMPLEMENT TO “CLEAN SEAS GUIDE FOR OIL TANKERS”

INTRODUCTION

This guide, which is a complement to the “Clean Seas Guide for Oil Tankers”, describes a method of monitoring slop oil retention, and has been prepared to assist the tanker industry in complying with effective Load-on-Top operations. It will assist loading terminals to understand the requirements for gauging slop tank contents of visiting tankers.

A prime objective of the Load-on-Top procedure is to minimize the amount of oil discharged to the sea.

The 1969 Amendments to the 1954 International Convention for the Prevention of Pollution of the Sea by Oil prohibit the discharge of any oil or oily mixture from a tanker within 50 miles of any coast.

Limited operational discharges may only be made when more than 50 miles off any coast providing all the following requirements are satisfied:

“'The tanker is proceeding en route'’;

“'The instantaneous rate of discharge of oil content (of any effluent) does not exceed 60 litres per mile. . . ’’;

“'The total quantity of oil discharged on a ballast voyage does not exceed 1/15,000 of the total cargo-carrying capacity’’.

It is important to recognize that the permitted discharge is only about 0.006% of the cargo deadweight, equivalent to about 1% to 2% of the oil that remains in the tanker after completion of a full cargo discharge. This means that 98% to 99% of the oil that remains on board at the end of discharge must still be retained on board after completion of tank cleaning procedures and change of ballast. This can be accomplished by using the Load-on-Top procedures that are detailed in the “Clean Seas Guide for Oil Tankers”.

The monitoring methods here described are, therefore, based on recognition of the fact that virtually all the oil that remains on board after discharge of cargo should still be aboard the tanker upon arrival at the next port.
Validity of Oil Retention Data

The quantity of oil retained as slop oil after completion of the Load-on-Top process is a function of many factors, e.g. type of previous cargoes and cleaning history, oil left on board at completion of discharge, weather on ballast passage, proportion of tanks washed. The variability of these factors requires that a range of quantities must be considered when assessing the Load-on-Top performance from measured quantities of retained slop oil.

With these qualifications it should be expected that the satisfactory practice of Load-on-Top will result in between 0.2% and 0.5% of the tanker cargo capacity being accumulated as slop oil in the designated slop tank. Based on several closely supervised Load-on-Top test procedures achieving 0.4% slop retention as an average for tanker performance is feasible.

Oil recovered into a slop tank will consist largely of oil from the water washing of pipelines and cargo tanks and from the transfer of dirty ballast water.

Experience to date in the test monitoring of several thousand tanker calls suggests the following simple formulae will give appropriate guidance as to the "minimum" amount of recovered oil to be expected:

(a) For ships of 150,000 DWT or more

Minimum recovered oil to be expected
\[ = \text{Cubic capacity of ship} + (3 \times \text{Cubic capacity of tanks washed}) \]
\[ = \frac{1,000}{1,000} \]

(b) For ships of less than 150,000 DWT

Minimum recovered oil to be expected
\[ = \text{Cubic capacity of ship} + (2 \times \text{Cubic capacity of tanks washed}) \]
\[ = \frac{1,000}{1,000} \]

These formulae apply to tanks washed with water. They do not apply when waterless washing techniques are used.

Although a volume of retained slop oil below that given by the formulae is not an absolute indication of higher than permitted discharges, it is sufficiently suspect to warrant further inquiry. For these reasons it is important that inspection reports indicating retained slop oil below the minimum volume to be expected should be accompanied by comments concerning the circumstances which may have legitimately contributed to such low quantities. One such reason might be the smooth tank construction of some combination carriers.
Scope of Tanker Load-on-Top Monitoring

Monitoring of tanker performance of the Load-on-Top process as recommended in this guide consists of three phases:

— Measurement by gaugers at loading terminal of retained slop oil and free water in the slop tank upon arrival at the loading port.

— The tanker Master's evaluation and comments on circumstances which may have influenced the quantities of slop oil and free water retained on board.

— Subsequent evaluation of the performance of the tanker by the tanker user and owner and the action, as may be necessary, to improve its Load on-Top practice.

Owner's Instructions

The owner should advise the tanker Master of the desirability of these monitoring procedures, and preferably should provide his ships with a copy of this Guide.
SECTION A

Measurement of Slop Tank Contents

The monitoring of Load-on-Top performance starts with measuring the contents of the slop tank. Terminal owners/operators should arrange for the gauging of the slop tank.

Qualifications and Functions of Gauging Personnel

The gauging personnel should be capable of gauging the slop tank in accordance with the procedures described in any recognized gauging standard manual. The U.S.A. Standard Method of Gauging Petroleum and Petroleum Products approved by A.P.I. Standard 2545 and by ASTM Designation D 1085-65 is one example of a recognized gauging standard. The gauging personnel must also have the ability to calculate the contents of the slop tank based on the gauging measurements and using appropriate ullage and petroleum tables and conversion factors as necessary. It is essential that the gauging is performed by competent persons, discretionary use being made of Independent Petroleum Inspectors if desirable.

Slop Tank

The slop tank may be a designated cargo tank, or a specially constructed tank or tanks that can receive slop oil, wash water, heavily contaminated dirty ballast water, line flushings and dirty bilge water for further separation of oil and water.

Slop Tank Contents

On arrival at the loading port, after a tanker has performed the Load-on-Top operation, the slop tank will contain oil and usually some free water under the oil.

The oil floating on top of the free water in the slop tank usually contains a certain amount of water in suspension. Although considerable variation exists, experience to-date indicates that the suspended water content does not generally exceed 30% and may be very much less.

For these reasons, in calculating the minimum expected recovered oil quantity, the effect of water suspended in the oil is ignored.

Free Water

Normally some free water will remain beneath the oil, the amount of which will depend upon the extent and duration of decanting carried out by the
vessel's personnel. A predetermined depth of free water known not to give rise to discharge of oil must be retained in the slop tank. Vessels equipped with instruments that can detect oil issuing from the stripping pump may be able to reduce the amount of free water. However, in no case should it be expected that all of the free water can be discharged without risking some oil discharge.

Vessels equipped with certain types of oil/water separators, if used correctly, may be able to eliminate all free water without discharging oil overboard.

**Gauging Slop Tank Contents**

The gaugers should measure the ullage of the surface of the slop oil, and the position of the interface of the slop oil and the free water. These measurements should then be used with the tanker’s ullage and trim tables to determine the volume of slop oil and free water in the slop rank.

In some cases, due to the consistency of the slop oil or the location of the ullage opening, it may not be possible to assess the free water in the slop tank in which case a notation to this effect should be made on the Monitoring Record.

**Temperature Correction**

It is not necessary either to determine the temperature of slop tank contents or to apply a temperature correction factor since any errors by not so doing are negligible.

**Oil/Water Interface Detectors**

Oil/water interface detectors, which work on the principle that salt water conducts electricity, are often used. Gauging personnel using interface detectors should be guided by the general instructions in the “Clean Seas Guide for Oil Tankers” supplemented by any operating instructions provided by the manufacturer of the equipment. Should occasions arise when it is not possible to use the oil/water interface detectors, then recourse to the use of water-finding paste or ribbon may be necessary.

**Safety Considerations**

The advice and consent of the Master or Chief Officer must be obtained when gaugers board a tanker prior to gauging the slop tank(s). Gaugers should not carry-out any gauging unless accompanied by a responsible officer.
Gauging personnel should be aware of and abide by all tanker and terminal safety precautions, particularly those applicable to the gauging process. Safety considerations include:

- preventing static discharges
- avoiding inhalation of harmful concentrations of toxic gas
- ensuring release of pressure in slop tank(s) on vessels with inert systems prior to opening the ullage plug(s).

SECTION B

Tanker Master’s Evaluation and Comments

An essential part of the monitoring procedure is the Tanker Master’s evaluation and reporting of circumstances which influence the Load-on-Top results achieved when the volume of retained slop oil falls below the minimum expected, or there is an absence of free water in the slop tank, or when other circumstances call for explanation or substantiation.

The Master's comments should be based on a review of the Oil Record Book and discussion with the Officers who conducted the Load-on-Top operation, and should include:

- Type of oil carried on previous voyage(s)
- Unusual cargo discharge conditions and stripping difficulties
- Quantity of dirty ballast carried
- Weather conditions on ballast passage
- Length of ballast passage
- Tank cleaning procedures and proportion of tanks washed
- Transfer level of dirty ballast to slop tank(s)
- Quantity of dirty ballast discharged ashore at loading port
- Difficulty in determining the interface of the slop oil and free water
- Any other pertinent comments.

Uses of the Reported Data to assist Ship Personnel

It is recommended that owners and masters maintain records of slop retention data for successive ballast voyages so as to assist in evaluating current trends in performance based on past performance.
SECTION C

Evaluation and Action

The Shipowner, Charterer and Tanker Master who receive the Load-on-Top monitoring record should evaluate objectively the recorded data.

Those who make the evaluation must recognise the large number of variables that may contribute to the quantities of slop oil retained and take into account the comments by the Master as to circumstances that surround the particular voyage.

A recognition of these factors in so far as they affect the quantity of slop oil reported in any particular case, will permit the evaluator to determine if the report deserves further inquiry.

In addition, on the basis of cumulative data means may be provided to improve these monitoring procedures, and form the basis for further guidance and assistance to those applying the Load-on-Top techniques.

SECTION D

Load-on-Top Monitoring Record

The gauging personnel should fill out and sign a Load-on-Top Monitoring Record for each vessel monitored. The ship’s master should add information on contributing circumstances when necessary and sign.

A recommended distribution of the completed Monitoring Record is as follows:

— Tanker Master: two copies (one for the Owner/Operator) to be issued before vessel leaves port
— Charterer
— Terminal

The Terminal should despatch the copy to the charterer promptly by airmail.

Monitoring Record Form

The following data should be recorded on the Monitoring Record by the gauger and Master at the loading port:

— Loading Port and Terminal
— Date of Inspection
— Ship’s Name
— Flag
— Summer Deadweight Tonnage
— Capacity of Cargo Tanks
— Name of Charterer
— Name of Owner/Operator
— Whether Load-on-Top Procedure followed this voyage (if not, state reason)
— Tanks washed this voyage (enumerate)
— Capacity of tanks washed
— Measurement of slop tank(s) contents
  (i) Total contents, ullage and volume
  (ii) Free water, volume
  (iii) Total oil, i.e. (i)-(ii)
— Minimum volume which should have been recovered under formula (a) or (b) as appropriate
— Master’s comments and evaluation
— Signatures of Gauger and Master.

**Pro-Forms Load-on-Top Monitoring Record**

Attached is a form recommended to be used for reporting the monitoring data.
# LOAD-ON-TOP
## MONITORING RECORD

<table>
<thead>
<tr>
<th>Port</th>
<th>Loading Terminal</th>
<th>Ship's Name</th>
<th>Flag</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Summer DWT</th>
<th>Capacity of Cargo Tanks</th>
<th>Name of Owner/Operator</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

1. L.O.T. Procedure followed this voyage: YES NO
2. If NO state reason: __________________________
3. Tanks washed this voyage. Numbers: __________________________
4. Capacity of tanks washed: __________________________ Unit: __________________________
5. Slop Tank(s) Measurements: Slop Tanks

<table>
<thead>
<tr>
<th>Ullage(s)</th>
<th>Volume</th>
<th>Total Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank A</td>
<td>Tank B</td>
<td>Tank A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(i) Total Contents

(ii) Free Water Content

(i)-(ii)=(iii) OIL

6. Minimum volume of oil which should have been recovered under formula (a) or (b) as appropriate:

<table>
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<tr>
<th>Unit</th>
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</tbody>
</table>

Signature of Gauger

7. Master's Evaluation and Comments (to include his reasons for low oil recovery this voyage):

Signature of Master

*NOTE:

(a) For Ships of 150,000 DWT or more
Minimum recovered oil to be expected
   =Cubic capacity of ship + (3 x Cubic capacity of tanks washed) / 1,000

(b) For ships of less than 150,000 DWT
Minimum recovered oil to be expected
   =Cubic capacity of ship + (2 x Cubic capacity of tanks washed) / 1,000

*These formulae apply to tanks washed with water. They do not apply where waterless washing techniques are used.*